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— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

Draft Final Letter Technical Plan for the Hydrazine Blending and Storage Facility Groundwater Investigation

May 13, 1991
Contract Number DAAA15-88-D-0021
Task IRA H Phase I (Delivery Order 0003)

Harding Lawson Associates

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13. ABSTRACT *(Maximum 200 words)*

THIS DRAFT FINAL LETTER TECHNICAL PLAN PRESENTS THE PROPOSED SCOPE OF WORK FOR THE HYDRAZINE BLENDING AND STORAGE FACILITY GROUND WATER INVESTIGATION. THE PURPOSES OF THE INVESTIGATION ARE TO 1) ASSESS THE NATURE AND EXTENT OF HYDRAZINE FUEL COMPOUNDS (HYDRAZINE, UDMH, MMH, NDMA) IN GROUND WATER AT OR NEAR THE HBSF AND 2) EVALUATE THE POTENTIAL FOR MIGRATION OF THE FUEL COMPOUNDS.

THE SCOPE OF WORK PROPOSED INCLUDES:

1. COLLECTING GROUND WATER SAMPLES FROM 12 WELLS NEAR THE HBSF
2. COLLECTING 1 EFFLUENT SAMPLE AT THE BASIN A NECK TREATMENT SYSTEM
3. COLLECTING 1 INFLUENT SAMPLE AT BOTH THE NORTH AND NORTHWEST BOUNDARY SYSTEMS.

THIS PLAN DESCRIBES THE FOLLOWING:

1. FIELD PROGRAM - SAMPLING LOCATIONS AND PROCEDURES, DECONTAMINATION
2. ANALYTICAL PROGRAM - PARAMETERS, CERTIFIED REPORTING LIMITS
3. QA/QC CONTROL

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TECHNICAL SUPPORT FOR ROCKY MOUNTAIN ARSENAL

Draft Final Letter Technical Plan
for the
Hydrazine Blending and Storage Facility
Groundwater Investigation

May 13, 1991
Contract Number DAAA15-88-D-0021
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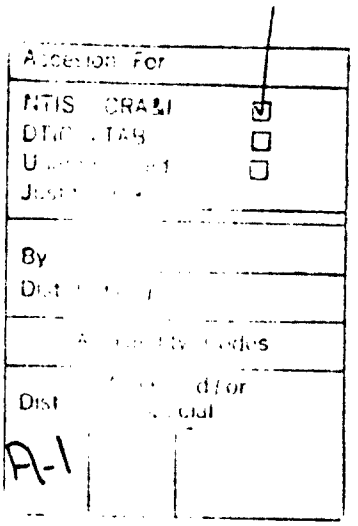

PREPARED BY

Harding Lawson Associates

PREPARED FOR

PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL

THIS DOCUMENT COMPLIES WITH THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969.

THE INFORMATION AND CONCLUSIONS PRESENTED IN THIS REPORT REPRESENT THE OFFICIAL POSITION OF THE DEPARTMENT OF THE ARMY UNLESS EXPRESSLY MODIFIED BY A SUBSEQUENT DOCUMENT. THIS REPORT CONSTITUTES THE RELEVANT PORTION OF THE ADMINISTRATION RECORD FOR THIS CERCLA OPERABLE UNIT.

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1.0 INTRODUCTION

This Draft Letter Technical Plan presents the proposed scope of work for the Hydrazine Blending and Storage Facility (HBSF) Groundwater Investigation. The purpose of this investigation is to assess the nature and extent (if any) of hydrazine fuel compounds (hydrazine, unsymmetrical dimethyl hydrazine [UDMH], and monomethyl hydrazine [MMH]) and N-nitrosodimethylamine (NDMA) in groundwater at or near the HBSF and evaluate the potential for migration of hydrazine fuel compounds and NDMA at RMA. The scope of work proposed includes collecting groundwater samples from 12 wells in the vicinity of the HBSF, collecting one effluent sample at the Basin A Neck Groundwater Treatment System, and collecting one influent groundwater sample at both the North Boundary Containment System (NBCS) and the Northwest Boundary Containment System (NWBCS). This plan describes the proposed sampling locations and procedures to be used for the sampling, health and safety, quality assurance/quality control (QA/QC), data management, and data reporting programs. Plan objectives and investigative strategy are discussed below.

1.1 OBJECTIVES

The objectives of the HBSF Groundwater Investigation include the following:

- Evaluate whether hydrazine fuel compounds and NDMA are present in groundwater near the HBSF
- Evaluate whether hydrazine fuel compounds and NDMA are present in effluent from the Basin A Neck Groundwater Treatment System
- Evaluate whether hydrazine fuel compounds and NDMA are present in influent to the NBCS and NWBCS

1.2 INVESTIGATIVE STRATEGY

The investigative strategy developed to meet the program objectives includes the following three components: (1) assessment of existing groundwater quality data, (2) generation of new data by collection and analysis of groundwater and groundwater treatment system influent and effluent samples, and (3) data interpretation and formulation of recommendations for future action.

The first component of the investigation, assessment of existing groundwater quality data, was completed before preparation of this Letter Technical Plan. Five wells in the vicinity of the HBSF were sampled for NDMA and the hydrazine fuel compounds in August 1990 and February 1991 as part of the groundwater Comprehensive Monitoring Program (CMP). These data alone are not sufficient to assess whether NDMA and the hydrazine fuel compounds are present elsewhere at RMA. The results of the assessment of existing data were used to develop the field and analytical programs described herein.

The field program for this investigation, including sampling locations and procedures, decontamination procedures, and sample handling procedures, is described in Section 2.0. Field activities will be performed in accordance with the health and safety and QA/QC guidelines discussed in Sections 4.0 and 5.0, respectively. Components of the field program were developed from procedures and guidelines utilized during previous RMA investigations.

The analytical program for this investigation is described in Section 3.0. Data generated will be managed in accordance with the data management program discussed in Section 6.0. The data interpretations to be performed as part of this investigation are discussed in Section 7.0.

2.0 FIELD PROGRAM

The field program for the HBSF Groundwater Investigation will consist of collecting groundwater samples from 12 wells and influent and effluent samples from three groundwater treatment systems for chemical analyses. Field activities will be performed in accordance with standard sampling, health and safety, QA/QC, and data management procedures established by PMRMA during prior field investigations at RMA.

2.1 SAMPLING LOCATIONS

The investigation will include sampling the following sites:

- 12 wells in the vicinity of the HBSF
- Treated effluent from the Basin A Neck Groundwater Treatment System
- Influent groundwater to the NBCS and NWBCS

The 12 wells proposed for sampling include the five wells previously selected for groundwater monitoring of NDMA and the hydrazine fuel compounds in the vicinity of the HBSF. The remaining seven wells were selected to provide additional data for the vicinity of the HBSF. Figure 2.1 shows the locations of the 12 proposed wells. Well-completion information and the rationale used in selecting these 12 wells are provided in Table 2.1.

Influent and effluent samples from groundwater treatment systems will be collected and analyzed to provide a preliminary indication of the extent (if any) of migration of hydrazine fuel compounds and NDMA contamination via groundwater away from the HBSF. Treated effluent from the Basin A Neck Groundwater Treatment System will be collected at the location currently used for weekly system performance sampling. Samples of influent to the NBCS and NWBCS will also be collected at the locations currently used for weekly system performance sampling. Figure 2.2 shows the locations of the three groundwater treatment systems.

Samples will be collected semiannually for one year, and analyses will be limited to the hydrazine fuel compounds and NDMA. If initial analytical results indicate the presence of target

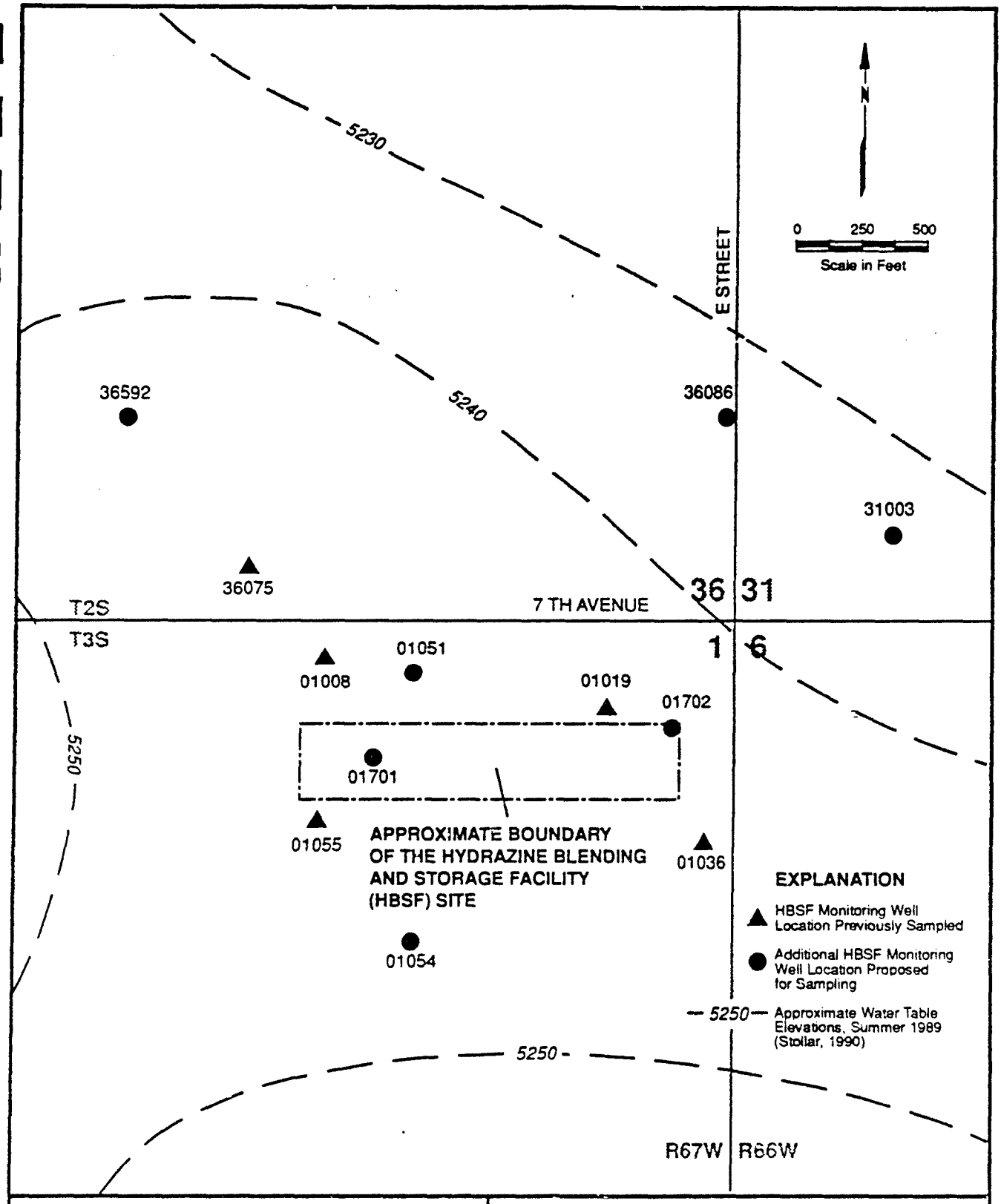

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Figure 2.1

PROPOSED GROUNDWATER WELL SAMPLING LOCATIONS

Table 2.1: Proposed Wells to be Sampled Near the Hydrazine Blending and Storage Facility and Rationale for Sampling

Well Number	Aquifer[1]	Screen[1] (feet[2])	Approximate Depth to Water[1] (feet[2])	Rationale
01008	Unconfined aquifer	16.6 - 20.0	14	Continued monitoring of previously sampled well
01019	Unconfined aquifer	22.4 - 25.8	20	Continued monitoring of previously sampled well
01036	Confined aquifer	40 - 60	15	Continued monitoring of previously sampled well
01055	Unconfined aquifer	11 - 21	15	Continued monitoring of previously sampled well
36075	Alluvial	7.6 - 11.0	10	Continued monitoring of previously sampled well
01051	Unconfined aquifer	11 - 21	16	Located downgradient (north) of HBSF; detections[3] reported in 1986
01054	Unconfined aquifer	13.5 - 23.5	13	Located upgradient (south) of HBSF; detections[3] reported in 1986
01701	Unconfined aquifer	15.2 - 40.2	15	Located north of below-grade sump within HBSF; detections[3] reported in 1986
01702	Unconfined aquifer	20 - 40	20	Additional control northeast of HBSF; detections[3] reported in 1986
31003	Alluvial/ unconfined aquifer	16.6 - 20	17	Additional control northeast of HBSF
36086	Unconfined aquifer	20.5 - 25.5	22	Additional control north of HBSF
36592	Unconfined aquifer	18 - 28	6	Additional control northwest of HBSF

HBSF = Hydrazine Blending and Storage Facility

[1] Source: DP Associates, 1990
[2] Measured from ground surface
[3] Hydrazine fuel compounds and/or N-nitrosodimethylamine (NDMA)

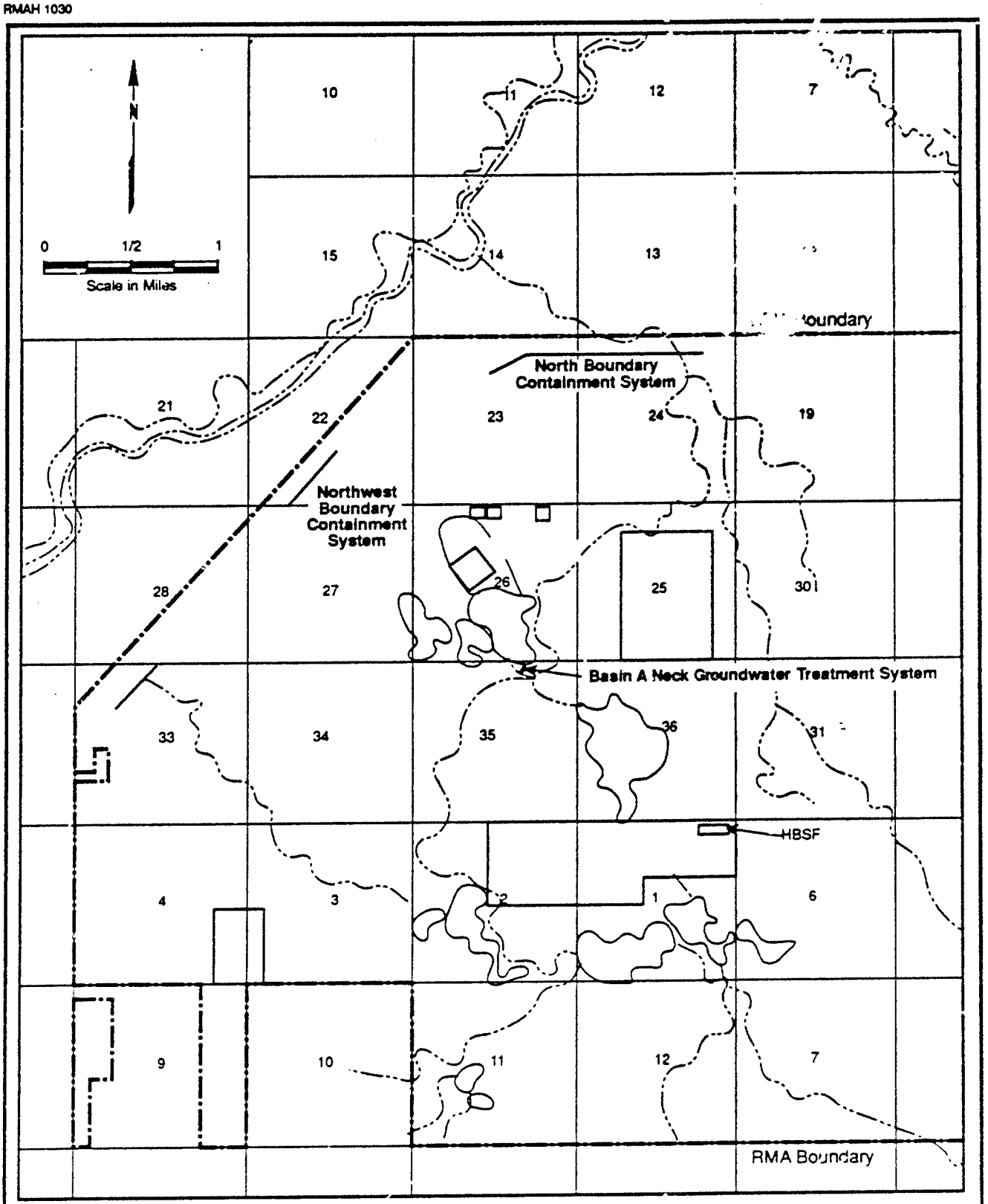

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Figure 2.2

PROPOSED GROUNDWATER TREATMENT SYSTEMS SAMPLING LOCATIONS

compounds at the RMA boundary treatment systems, additional samples may be collected from treatment system effluent streams.

2.2 SAMPLING PROCEDURES

This investigation will include collecting groundwater samples from wells, influent and effluent samples from RMA groundwater treatment facilities, and QA/QC samples (i.e., duplicates, trip blanks, and rinse blanks) for chemical analyses. The sampling procedures for each type of sample are described separately below. Decontamination and sample handling procedures are described in Sections 2.3 and 2.4, respectively. Field data collected during this program will be recorded on preprinted field data sheets (Figure 2.3) and in bound field logbooks.

2.2.1 Monitoring Well Sampling

Monitoring well sampling procedures will comply with those developed and employed under previous investigations, including the CMP (Stollar, 1989) and the Offpost Interim Response Action and Remedial Investigation/Feasibility Study (HLA, 1989a). A summary of these procedures is presented below.

Upon arrival at the well site, the following procedures will be implemented:

1. A precalibrated photoionization detector (PID) will be zeroed to ambient air conditions. With respirators on and from an upwind direction, the well will be uncapped and background and casing headspace readings recorded with the PID. Respirators may be removed if PID values are at background levels within the breathing zone around the well head. Respirators need not be donned when approaching the well if PID readings and analytical data from the previous two sampling events indicate no elevated contaminant levels.

2. Well number, date, pertinent observations (e.g., weather, well condition), station elevation, casing diameter, screened interval, and field instrument identification will be recorded.

3. Well stickup, depth to water, and total well depth will be recorded. Measurements will be made from a measuring point marked at the top of casing (TOC). Measured values will be compared with previous measurements; any discrepancies will be investigated and documented. Measuring devices used to obtain water level and total depth measurements will be decontaminated with deionized (DI) water.

4. Water-filled casing volume will be calculated, recorded, and compared with previous volumes to ensure relative consistency.

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GROUND-WATER SAMPLING FIELD DATA SHEET

Log Book # _____
Page _____ of _____

Well ID. No.	Purge Equipment ☐ Dedicated Pump Settings: Charge _____ Discharge _____ ☐ Bennett Pump (Teflon Tubing) ☐ Meyers Pump (PVC Tubing) ☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in. ☐ Stainless Bailer: O.D. LENGTH 1.65" ☐ ☐ 2 ft. 1.85" ☐ ☐ 3 ft. 3.75" ☐ ☐ 4 ft. ____" ☐ ☐ ____ ft. SERIAL NO.	Analytical Equipment pH Meter: ☐ Beckman phi 21 ☐ HACH ☐ Orion SA250 ☐ Other _____ SERIAL NO. _____ Conductivity Meter: ☐ YSI Model 33 ☐ Curtin Matheson ☐ Other _____ SERIAL NO. _____ Dissolved Oxygen Meter: ☐ YSI Model 51B SERIAL NO. _____ Temperature Meter: ☐ Beckman phi 21 ☐ HACH ☐ Orion SA250 ☐ Other _____ SERIAL NO. _____ Filtration Equipment: ☐ Geotech Peristaltic Pump ☐ Geotech 0.45 micron filter ☐ Dispos. 0.45 micron filter Water Level Meter: Solinst ___ HLA# ___	Samplers initials / Time / Date	
Casing Diameter in.				
Casing Stickup ft.				
Total Well Depth ft.				
Static Water Level ft.				
Saturated Thickness ft.				
Casing Volume / Annulus Vol. gal.				
Screened Interval ft.				
Purge Containerized ? ☐ Yes ☐ No	Sample Equipment ☐ Dedicated Pump Settings: Charge _____ Discharge _____ ☐ Bennett Pump (Teflon Tubing) ☐ Meyers Pump (PVC Tubing) ☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in. ☐ Stainless Bailer: O.D. LENGTH 1.65" ☐ ☐ 2 ft. 1.85" ☐ ☐ 3 ft. 3.75" ☐ ☐ 4 ft. ____" ☐ ☐ ____ ft. SERIAL NO.	Bulk ☐ Tank # _____ Barrel ☐ #'s _____		

Meter Calibration

pH 7.00= _____ at _____ °C _____ Time
pH 10.00= _____ at _____ ° C _____ Time
Conductance Standard: _____ umhos/cm at 25°C
Measured Value: _____ umhos/cm at _____ °C _____ Time
Calibrated Conductivity = Measured Conductance ÷ (0.02 (measured conductance) (25°C - Actual Temp)):
_____ umhos/cm at 25°C _____ Time
Dissolved Oxygen _____ mg/l at _____ °C _____ Time

Titration Results (Acid Concentration: 0.16, 1.6)

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				
Sample Depth: (ft.)				

Time	Number of Casing Volumes	Gallons Removed	Water Level	°C	E.C. umhos/cm	pH	Dissolved O_2 mg/Liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description

Filter
Analysis Requested

☐☐☐ HNu / OVm / Microtip

Initial Readings: TOC _____ BZ _____ Bkgnd _____
Sample Readings: TOC _____ BZ _____ Bkgnd _____

Protective Level: A B C D

Serial # _____
HSO Signature:
Condition of Well, Remarks:
Sampler Signature:

Prepared for:
Program Manager for
Rocky Mountain Arsenal

Commerce City, Colorado

Figure 2.3

SAMPLE GROUNDWATER SAMPLING FIELD DATA SHEET

5. Field instruments will be calibrated against known standards. Instrument calibration responses, times, and calibration standards used will be recorded. Field instrumentation will be used to monitor the following parameters: pH, temperature, conductivity, alkalinity, and dissolved oxygen (pumped wells only).

6. The decision to pump or bail a well will be made on the basis of the relative efficiency of either method with respect to the amount of purge water to be removed. In general, wells containing less than 4 gallons per casing volume or known to dewater at one casing volume will be purged and sampled by bailing. All other wells will be pumped.

7. All wells will be purged and sampled from the top of the water column. Bailers will be slowly lowered into the water column to a depth equal to the length of the bailer being used. Pumps will be placed 2 to 3 feet below the top of the water column and repositioned as necessary in response to water-level fluctuations during evacuation. An in-line flow cell consisting of an airtight chamber fitted for instrument probes will be used on all pumped wells. Dissolved oxygen will be measured for all pumped wells in addition to parameters listed in procedure 5 above.

8. The following information will be recorded for a portion of the initial water discharged from the well: field parameter values (pH, temperature, conductivity, and dissolved oxygen), time, PID reading, pumping rate, and purged volume removed. Similarly, this information will be documented after each casing volume is removed. Purged water will be containerized at the well site.

9. A minimum of five casing volumes will be removed from each well prior to sampling. However, samples will not be collected until field parameters have stabilized from three consecutive casing volumes. Wells that dewater prior to the removal of five casing volumes or stabilization will be exempt from these requirements. Samples will be collected from these wells following evacuation of one casing volume and subsequently when sufficient recharge has been attained. Dewatered wells will be allowed a maximum of 24 hours to recharge. If sufficient recharge is not attained within a 24-hour period, as many sample fractions as possible will be collected.

10. Sample parameters will also be measured and recorded immediately prior to sample collection. Sample labels will be completed to include the following information: well number, time, date, temperature (°C), conductivity, pH, sampler's initials, and dissolved oxygen (for pumped wells only).

11. When pumps are being used, samples will be collected directly from pump discharge lines at low flow rates to avoid agitating samples and possibly degassing volatiles. If bailed, samples will be collected from bottom decanting bailers.

12. Certified clean sample containers will be used; no rinsing is required prior to filling. All sample fractions will be placed on ice in a cooler immediately upon filling. Sampling technique, sample depth, and fractions collected will be recorded on the sample data sheet, chain-of-custody record, and in the field logbook.

13. The field team leader will sign and date the sample data sheet after ensuring that the sheet has been fully completed and the information has also been recorded in the field logbook. The field team leader will complete the chain-of-custody record before relinquishing the samples.

14. Sampling equipment will be thoroughly decontaminated at the well site prior to storage. Except for pumps, equipment will be cleaned in a solution of deionized water and

Liquinox cleaner or equivalent, and triple-rinsed with deionized water. To decontaminate the inside of the pump, a volume of deionized water equal to three times the volume of the pump and hoses will be pumped through the line. Decontamination water will be containerized at the well site. Cleaned equipment will be wrapped and stored in clean plastic sheeting. The normal means for disposing well and decontamination water will be to containerize it in a truck-mounted tank. The water will then be transported to the RMA Decontamination Pad for ultimate disposition. If any barrels are used to containerize well and decontamination water, they will be transported to the RMA Decontamination Pad and contents will be transferred to the wastewater storage tanks. Emptied drums will be decontaminated at the Decontamination Pad in accordance with standard procedures. In accordance with RMA policy, no liquid will be stored in drums.

15. The final activity at the well site will be to remove sampling equipment and debris from the area for appropriate storage and disposal using established RMA procedures.

2.2.2 Treatment System Influent/Effluent Sampling

Procedures for sampling treatment system influent and effluent will comply with guidelines outlined in the RMA Chemical Quality Assurance Plan (CQAP) (PMRMA, 1989). Systems operations personnel at RMA will be consulted regarding the appropriate manifolds from which samples are to be collected.

2.2.3 Quality Assurance/Quality Control Samples Collection

Groundwater and treatment system influent and effluent QA/QC samples will be collected to evaluate the precision and accuracy of reported results. The QA/QC schedule for each sampling event is shown in Table 2.2.

Five duplicate samples will be collected for each round of sampling: three from wells in the vicinity of the HBSF and two from the influent streams of the NBCS and NWBCS. Two trip blanks and two rinse blanks will also be collected and analyzed for NDMA and the hydrazine fuel compounds during each round of sampling. Trip and rinse blank samples will be collected randomly from wells selected for groundwater sampling.

2.3 DECONTAMINATION PROCEDURES

Groundwater sampling equipment will be decontaminated between sampling locations. Bailers and filtering equipment will be decontaminated by washing in a detergent solution (Liquinox or equivalent), triple-rinsing with deionized water, allowing to air dry, and wrapping in

Table 2.2: Quality Assurance/Quality Control Schedule for Each Sampling Event

Analyses	Number of Investigative Samples for Certified Analyses[1]	Number of QC Duplicate Samples	Number of Trip and Rinse Blanks	Total Number of Analyses
NDMA[2]	15	5	4 (2 each)	24
UDMH/HYD[3]	15	5	4 (2 each)	24
MMH[4]	15	5	4 (2 each)	24
		Total Number of Analyses		72

[1] Analyses will be performed according to PMRMA-certified methods for N-nitrosodimethylamine (NDMA) and the hydrazine fuel compounds. Turnaround time (TAT) for diskette deliverables will be 35 days from the date of sampling. Control charts/quality control (QC) reports will be required within 45 days of the date of sampling.

[2] NDMA will be analyzed at DataChem Laboratories, Inc., Salt Lake City, Utah.

[3] UDMH/HYD is the abbreviation for the unsymmetrical dimethyl hydrazine and hydrazine analytical method developed at Vista Laboratories, Inc., Wheat Ridge, Colorado, for analysis of these compounds. Hydrazine and UDMH will be analyzed at Vista Laboratories.

[4] MMH is the abbreviation for the monomethyl hydrazine analytical method developed at Vista Laboratories, Inc., Wheat Ridge, Colorado, for analysis of this compound. MMH will be analyzed at Vista Laboratories.

plastic. Pumps and discharge tubing will be decontaminated by pumping an amount of deionized water equivalent to three times the total volume contained within the pump and tubing through the system.. Probes used to measure field parameters will be cleaned by rinsing with deionized water. Nylon rope used for bailing will not be decontaminated for reuse but will be disposed of appropriately.

2.4 SAMPLE HANDLING PROCEDURES

2.4.1 Sample Custody

A chain-of-custody form (Figure 2.4) will be initiated at the time of sample collection for each sampled collected. The custody form will list the sample fractions for analysis, provide the date, time, and location of collection, and list sampling personnel. The original copy of the chain-of-custody form will remain with the sample and will be signed and dated by both the person relinquishing custody and the person assuming custody each time the sample is transferred. If samples are delivered by HLA personnel to a local analytical laboratory, sample custody will be transferred directly from HLA personnel to laboratory personnel. If samples are to be shipped overnight to a non-local laboratory, sample custody will be transferred to the laboratory via a bonded courier. For non-local transfers, the custody form will be sealed in a plastic bag and taped to the inside of the cooler lid. Each cooler will be sealed with tamperproof evidence tape prior to shipment.

2.4.2 Sample Preservation and Shipment

Samples will be maintained at 4°C or below from the time of collection through shipment to the analytical laboratory using either ice or "blue ice" inside insulated sample coolers. Samples will be stored such that samples will not freeze. Properly labeled (Figure 2.5) and sealed sample containers will be wrapped in bubble-wrap, packed in ice, and shipped to the designated analytical laboratory.

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CHAIN-OF-CUSTODY RECORD

Lab ID:	Project Name:	Sample Date:	Site Type:	Site Identification:

Samplers: (Signature)	Sample Depth: (cm)	Sample Technique:

TIME	TAG NO.	ANALYSIS REQUIRED	CONTAINER	PRESERVATIVE/REMARKS

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Airbill Number

Laboratory Copy White | Project Office Copy Yellow | Field or Office Copy Pink

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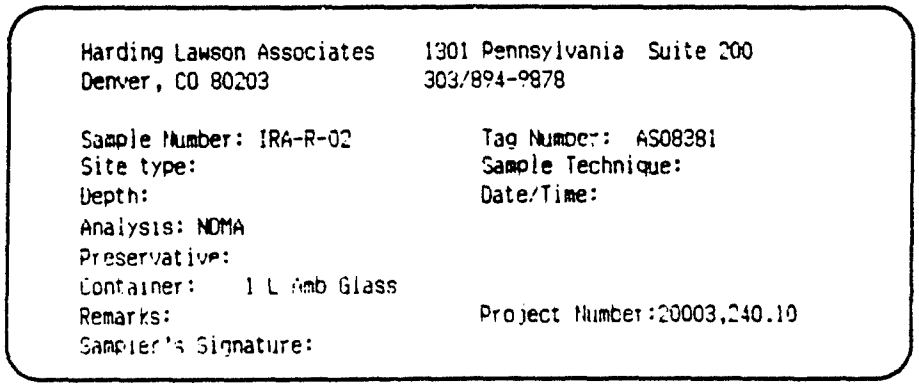
Program Manager for
Rocky Mountain Arsenal

Commerce City, Colorado

Figure 2.4

SAMPLE CHAIN OF CUSTODY FORM



Prepared for: Program Manager for Rocky Mountain Arsenal Commerce City, Colorado	Figure 2.5 SAMPLE LABEL

3.0 ANALYTICAL PROGRAM

Groundwater, treatment system influent and effluent, and QA/QC samples will be submitted to DataChem Laboratories (DataChem), Salt Lake City, Utah, and Vista Laboratories (Vista), Wheat Ridge, Colorado, for chemical analyses. All analyses will be performed in accordance with standard PMRMA-certified analytical methods as follows: UN09 for the analysis of NDMA at DataChem and HY08 and MH08 for the analysis of hydrazine fuel compounds at Vista. Samples will be analyzed for the presence of NDMA, hydrazine, MMH, and UDMH. Analytical methods to be employed were developed and certified during the HBSF Interim Response Action (IRA) Phase I analytical program. The certified method for the analyses of NDMA is based on EPA Method 607 (Federal Register, 1989). Analytical methods for the analysis of the hydrazine fuel compounds were developed on the basis of an unpublished method developed by Engineering-Science under a contract with the U.S. Air Force (Engineering-Science, 1988). All methods to be employed during this program are Class 1 certified methods with the exception of the UDMH portion of method HY08, which is a Class 2 certification.

Certified reporting limits (CRLs) for the methods to be employed are provided in Table 3.1. Quantitations will be reported in micrograms per liter ($\mu g/l$) of the target analyte of concern with the exception of UDMH results, which will be reported as either greater than or less than the CRL. Standard PMRMA-required deliverables, including floppy disk deliverables, control charts, and raw data packages, will be required. Control charts and disk deliverables will be delivered to HLA by the contract laboratory no later than 35 days after receipt of the last sample. Raw data packages will be maintained by the laboratory for six months after project completion and will then be transferred to PMRMA for ultimate storage in the administrative record.

Table 3.1: Certified Reporting Limits for Water Analyses

Target Analyte	Certified Reporting Limit (µg/l)
Hydrazine (Hydz)	9.9
Monomethyl hydrazine (MMH)	7.5
Unsymmetrical dimethyl hydrazine (UDMH)	25
N-nitrosodimethylamine (NDMA)	0.042

µg/l = micrograms per liter

4.0 HEALTH AND SAFETY

Field activities associated with this investigation will be conducted in accordance with the health and safety guidelines established under previous RMA onpost and offpost investigations and for well sampling activities. The Final Safety Plan for the HBSF IRA (HLA, 1989c) will also be available to field personnel for questions concerning hydrazine products. A summary of the health and safety procedures to be followed during field activities is described below.

Field personnel will utilize modified Level D personal protective equipment (PPE) during all sampling activities. Modified Level D PPE will consist of Tyvek coveralls, steel-toed boots, boot covers, safety glasses, and inner and outer gloves. Air monitoring will be conducted with a PID during sampling activities. If continuous readings of above background level are detected in the breathing zone, the field crew will leave the area until readings return to background level or personnel will upgrade PPE to Level B. Level B PPE includes the use of a self-contained breathing apparatus (SCBA) in addition to the modified Level D PPE described above. Upgrades to Level B to minimize the potential for exposure to hydrazine products is not anticipated. Previous well sampling analysis indicate very low levels of these products with a drop in detectable levels during the second round of sampling. Based on these historical data, conducting sampling activities in the open air in Modified Level D PPE will provide adequate protection for sampling personnel.

PPE used during sampling will be containerized and stored onsite in Building 786. To prevent cross-contamination, the outermost pair of gloves worn by the field crew will be changed before leaving the work site. Tools and sampling equipment will be decontaminated using standard procedures developed for RMA investigations and described in Section 2.3.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The QA/QC procedures described in this section are consistent with those outlined in the CQAP and the Final Quality Assurance Program Plan (QAPP) for the HBSF IRA (HLA, 1989b). The purpose of these procedures is to identify specific responsibilities and authorities relative to data QC. Procedures are outlined for the identification and correction of out-of-control situations, ensuring that nonlaboratory activities do not compromise analytical data results. Additionally, subcontractors will perform work in a manner that satisfies specified project objectives and the requirements set forth in the CQAP and the QAPP. Procedures for sampling and sample preservation, shipment, inspection, and logging will be consistent with those used previously at RMA.

QC sample introduction and lot sizing will be performed in accordance with the CQAP. Internal (laboratory) QC samples will be introduced as required by the PMRMA-certified method. Instrument calibrations will be performed as outlined in the CQAP and QAPP and will include an initial and daily calibration prepared from known standards. Standards and samples will be analyzed in an in-control environment, as outlined in the CQAP and QAPP, and charted to assess on a lot basis whether data are of acceptable quality. Control charts and standard QC reference materials will be evaluated for percent recovery as compared to previous analyses to evaluate method performance. Standard control chart checklists and analytical summaries will be reviewed to identify out-of-control situations that may arise and suggest corrective action to PMRMA.

External QC samples will be collected and analyzed to evaluate individual sample lots for laboratory-introduced artifacts and homogeneity of the sampling media. Duplicate analyses will be used to qualitatively monitor analytical precision.

Samples will be tracked using a standard chain-of-custody and electronic tracking system developed for the RMA project. Raw data will be stored in duplicate on disk and hardcopy forms. Final disk deliverable results will be updated as necessary to meet CQAP criteria.

6.0 DATA MANAGEMENT

Samples requiring laboratory analysis will be shipped under chain-of-custody to the appropriate contract laboratory, as previously described. A tracking system for samples will be employed from sample collection through final laboratory analysis and return of samples to RMA. The laboratories will log the samples in a logbook specific to the program and will review the sample tags and accompanying field chain-of-custody records. The laboratories will be responsible for assigning samples to the analyses stated on the field chain-of-custody record and for ensuring that the analyses are conducted within the criteria established in the CQAP.

Laboratory personnel will be responsible for coding results of analyses into the format prescribed for use in the Installation Restoration Data Management System (IRDMS). Data entry and data validation will be conducted by laboratory personnel utilizing the PC-based IRDMS programs provided by PMRMA. Following QA/QC by HLA and PMRMA, the data will be entered in the IRDMS for use in preparing project report documents.

7.0 DATA REPORTING

Preliminary analytical results from each sampling event will be provided to PMRMA in data progress reports when preliminary results become available from the laboratories. Progress reports will also be provided upon elevation of preliminary data into the final RMA data base.

Both existing data and data collected under this plan will be utilized to complete preliminary assessments following each sampling event. The results of these assessments will be utilized to formulate recommendations to PMRMA regarding future actions. A letter summarizing the analytical results and providing recommendations for future actions will be submitted to PMRMA upon completion of the investigation (i.e., after two semiannual sampling events).

Data assessment and recommendations may be forwarded prior to completion of the investigation as dictated by the nature of the analytical results from each sampling event.

8.0 REFERENCES

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